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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 3166-01-WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/US 03/1 1955	International filing date (day/month/year) 17.04.2003	Priority date (day/month/year) 19.04.2002
International Patent Classification (IPC) or both national classification and IPC C10M163/00		
Applicant THE LUBRIZOL CORPORATION et al.		



- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 04.11.2003	Date of completion of this report 03.09.2004
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Kazemi, P Telephone No. +49 89 2399-8592 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/US 03/11955**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-22 as originally filed

Claims, Numbers

1-8 filed with telefax on 02.07.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☒ the claims, Nos.: 9
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-8
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-8
Industrial applicability (IA)	Yes: Claims	1-8
	No: Claims	

2. Citations and explanations

see separate sheet

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EXAMINATION REPORT - SEPARATE SHEET**

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Concerning section V

1. The amended claims are directed to the combination of a condensation product (b-1), specific Mannich dispersant (b-2) and antioxidant (d) in defined amounts.

The claims as amended can be considered novel over the document WO93/03120 (or D1), which also represents the closest prior art, since it does not disclose a specific composition comprising all the components in the specified amounts, in particular the antioxidant.

The subject-matter of claims 1-8 thus meets the requirements of Article 33(2) PCT.

2. The subject-matter of the amended claims is not considered to involve an inventive step as required by Article 33(3) PCT.

The subject-matter of the present claim 1 differs thus from the generic teaching of D1 suggesting the combination of b-1, b-2 and the incorporation of among others an antioxidant, see page 51, line 5ff., in that the amounts of the antioxidant is explicitly defined. D1 refers to lubricants for conventional spark-ignited two-cycle engines whereas the present application refers to lubricants for direct fuel injected (DFI), crankcase-scavenged two-stroke engines. It is indicated in the present application that there is a difference between the requirements set for lubricants for DFI engines and the conventional two-stroke engines due to the higher operating temperature. Therefore the problem the skilled person has to solve is to cope with the engine protection at higher temperatures while lower oiling rates than provided by the conventional engines are applied. This is said to lead to carbon build up in the ring grooves which can lead to engine seizure.

Although D1 does not refer to this particular problem it refers to engine cleanliness in general. Thereby it suggests to use the combination of dispersants as defined in claim 1. In the conventional two-cycle engines the use of antioxidant is normally not necessary or helpful, since the lubricants are applied in admixture with a fuel, combusted and are thus once-through, they are neither exposed to high temperatures nor to any significant residence times, like in the crankcase scavenged engines, as is well known to the person skilled in the art.

The solution the present application according to the amended claims now offers

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is to additionally use an antioxidant and simultaneously controlling the nitrogen content of the lubricant, which as such also is a well known measure. Antioxidants are known to protect lubricants when these are exposed to high temperatures.

The applicant argues that the combination of components b-1, b-2 and a specific amount of an antioxidant, not defined in the prior art, is essential for the present invention. According to the applicant the additional data that has been provided in support shows that a specific amount of antioxidant in combination with certain dispersants leads to a significant improvement over compositions not comprising all the essential components and thus not falling within the scope of the claims.

The additional examples fail, however, to show any inventive merit.

It should be noted that the original examples 1 to 3 are not directly comparable since too many alterations were made between the compositions. The IPEA understands that the newly filed examples 1 to 3 correspond to the originally filed examples 1 to 3. It should be further noted that examples 1 and 2 do not reflect the invention longer.

According to the applicant the additional examples show that the combination of b-1, b-2 and antioxidant in the claimed amounts (Ex 3) improves the performance of lubricating oils in DFI OPTIMAX 225 and 150 Engine performance tests. Whilst the IPEA notes that the top carbon ring (OPTIMAX 150 engine) has its lowest value for example 3, it cannot follow the arguments of the applicant that both test values for all the compositions must be similarly low or high, since these values have not been shown to be linked in a convincing way. The applicant argues example 1 showing both values should provide a link between the two tests. The IPEA is not able to draw the same conclusions as the applicant, since only one single pair of values have been provided. This is not sufficient to show a real correlation between the two tests. The applicant states that unexpected results are obtained when using the combination of the dispersants in the presence of an antioxidant in a specific range over compositions falling outside the scope of the claim, thereby referring to example 3 being much better than examples 4 and 6. Although it is seen that the result looks better, would the said link with example 1 be valid, the indicated examples 4-6 simultaneously alter up to 6 compounds (amounts and types) when compared to example 3, so that it is not possible to draw any clear conclusion. Further, the examples do not convince IPEA, that the claimed features are essential, compare e.g. the rather good results of example 7

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not containing the required Mannich dispersant (b-2), with example 2 not containing the antioxidant but containing PIB. The improvement of example 7 over example 2 cannot, however, be only ascribed to the antioxidant since also another compound has been altered, notably PIB has been removed.

For these reasons it is considered to be obvious to add an antioxidant in typical amounts to lubricating compositions (known to provide sufficient cleanliness) in order to improve their high temperature properties so as to make them suitable for use in a related application having this requirement.

Following from this, claim 1 lacks an inventive step.

The dependent claims 2-8 concern further obvious embodiments and do therefore also not involve an inventive step.

Concerning section VII

3. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

Concerning section VIII

4. The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT.

3166R-01

What is claimed is:

1. A lubricant composition suitable for lubricating a direct fuel injection two-stroke engine, comprising:

(a) at least about 40 percent by weight of an oil of lubricating viscosity;
(b-1) about 0.5 to about 8 percent by weight of at least one condensation product of a fatty hydrocarbyl monocarboxylic acylating agent with an amine or ammonia, and

(b-2) about 0.5 to about 8 percent by weight, based on the lubricant composition, of at least one Mannich dispersant wherein the Mannich dispersant is the reaction product of a polybutene-substituted phenol, formaldehyde, and ethylenediamine or dimethylamine;

(c) 0 to about 45 percent by weight of a combustible solvent having a viscosity of less than $2 \text{ mm}^2\text{s}^{-1}$ (cSt) at 100°C ; and

(d) 0.5 to about 2.0 percent by weight of an antioxidant;

provided that the total amount of (b-1) plus (b-2) plus any dispersants in the lubricant composition other than (b-1) and (b-2) is at least about 1.5 percent by weight, further provided that the total nitrogen content in the lubricant composition is about 0.25 to about 0.75 percent by weight.

2. The lubricant composition of claim 1 further comprising (b-3) about 0.5 to about 8 percent by weight of at least one additional dispersant of a type other than (b-1) and (b-2).

3. The lubricant composition of claim 2 wherein the additional dispersant (b-3) is an alkyl amino phenol dispersant, a mono-succinimide dispersant, a hydrocarbyl-amine dispersant, a polyether dispersant, or a coupled phenol dispersant.

4. The lubricant composition of claim 1 wherein the condensation product of (b-1) is the condensation product of a fatty acid having about 12 to about 24 carbon atoms with a polyamine.

5. The lubricant composition of claim 4 wherein the fatty acid comprises isostearic acid and the polyamine comprises tetraethylenepentamine.

6. The lubricant of claim 1 admixed with a major amount of liquid fuel composition.

7. A method of lubricating a direct fuel injection two-cycle engine, comprising supplying the lubricant composition of claim 1 to the engine.

8. The method of claim 7 wherein the lubricant composition is admixed with a major amount of a liquid fuel composition, and the resulting mixture is supplied to the engine.